WHAT IS CLAIMED IS:

1   1.   For use in an edge device of a transport network, a

2   method for processing data, received from a first customer

3   device via access facilities, addressed to a second

4   customer device, the method comprising:

5   a)   terminating, with a physical interface, a link of

6   the access facilities;

7   b)   associating at least one logical interface with

8   the physical interface;

9   c)   associating customer context information with the

10   logical interface; and

11   d)   upon receiving the data,

12   i)   removing at least a part of layer 2 address

13   information from the data to generate resulting

14   data, and

15   ii)   adding the customer context information to

16   the resulting data to generate modified data.

1   2.   The method of claim 1 wherein the customer context

2   information added to the resulting data is added in the

3   place of the at least a part of the layer 2 address

4   information removed.

1   3.   The method of claim 1 further comprising:

2   e)   aggregating the modified data at the logical

3   interface with other modified data at other logical

4   interfaces, for trunking on a shared, network-facing,

5   communications link.

1   4.   The method of claim 1 further comprising:

2 f) saving, in association with the logical interface,

3   layer 2 source address information of the data.

1 5. The method of claim 1 wherein at least a portion of the

2 customer context information identifies a unique virtual

3 private network customer.

1 6. The method of claim 5 wherein at least a portion of the

2 customer context information identifies a unique host of

3 the unique virtual private network.

1 7. The method of claim 5 wherein at least a portion of the

2 customer context information uniquely identifies the

3 logical interface within a given virtual private network

4 customer.

1 8. The method of claim 1 wherein at least a portion of the

2 customer context information uniquely identifies the

3 logical interface.

1 9. The method of claim 1 wherein at least a portion of the

2 customer context information identifies a class of service

3 level.

1 10. The method of claim 1 wherein at least a portion of

2 the customer context information identifies a quality of

3 service level.

1 11. The method of claim 3 further comprising:

2 f) receiving the modified data from the shared,

3   network-facing, communications link; and

4   g)   encapsulating the modified data with carrier

5   information, used to forward the modified data across

6   the transport network to a second edge device with

7   which the second customer device has access.

1   12.   The method of claim 11 wherein the carrier information

2   includes an address of the second edge device.

1   13.   The method of claim 11 wherein the data includes a

2   layer 3 destination address corresponding to a layer 3

3   address of the second customer device, and

4   wherein the address of the second edge device is

5   derived from a layer 3 destination address of the data and

6   at least a part of the customer context information.

1   14.   The method of claim 11 wherein the carrier information

2   includes service level information.

1   15.   The method of claim 11 wherein the data includes a

2   layer 3 destination address corresponding to a layer 3

3   address of the second customer device, the method further

4   comprising:

5   h)   at the second edge device, removing the carrier

6   information to obtain the modified data; and

7   i)   advancing the data to a logical interface

8   associated with the second customer device, wherein

9   the logical interface associated with the second

10   customer device is determined based on the layer 3

11   address of the second customer device and at least a

12   part of the customer context information.

1   16.   The method of claim 15 wherein the data is advanced to
2   the logical interface associated with the second customer
3   device by generating an effective address of the logical
4   interface associated with the second customer device, based
5   on at the layer 3 address of the second customer device and
6   at least a part of the customer context information.

1   17.   The method of claim 16 further comprising:
2   j)   replacing as a destination address, the effective
3   address with a layer 2 address of the second customer
4   device.

1   18.   The method of claim 17 wherein the layer 2 address of
2   the second customer device was previously associated with
3   its corresponding logical interface and stored.

1   19.   The method of claim 1 wherein the layer 2 address
2   information of the data is part of an Ethernet header, and
3   wherein the customer context information replaces a
4   value in a layer 2 source address field of the Ethernet
5   header.

1   20.   The method of claim 3 wherein the layer 2 address
2   information of the data is an Ethernet header,
3   wherein the customer context information replaces a
4   value in a layer 2 destination address field of the
5   Ethernet header, and
6   wherein a node terminating the shared, network-facing,
7   communications link operates in the promiscuous mode.

1 21. For use in a system including a transport network, the
2 transport network including at least two edge devices, each
3 of the at least two edge devices being accessible to
4 customer devices via access facilities and having logical
5 interfaces, each logical interface uniquely associated with
6 a customer device, a machine readable medium having stored
7 thereon:
8   a) data received from a first customer device and
9   addressed to a second customer device; and
10   b) customer context information associated with the
11   logical interface uniquely associated with the first
12   customer device.

1 22. The machine readable medium of claim 21 wherein at
2 least a part of the customer context information uniquely
3 identifies the logical interface.

1 23. The machine readable medium of claim 21 wherein at
2 least a part of the customer context information uniquely
3 identifies a customer.

1 24. The machine readable medium of claim 21 wherein at
2 least a part of the customer context information identifies
3 a service level.

1 25. The machine readable medium of claim 21 further having
2 stored thereon:
3   c) carrier information used to forward the data,
4   across the transport network, to an edge device
5   associated with the second customer device.

1   26.   The machine readable medium of claim 25 wherein the

2   carrier information includes an address of the edge device

3   associated with the second customer device, and

4   wherein the address of the edge device is based on the

5   address of the second customer device and at least a part

6   of the customer context information.

1   27.   For use at an edge device of a transport network, the

2   edge device serving customer devices coupled via access

3   facilities, a method for maintaining carrier information

4   tables, the method comprising:

5   a)   terminating, with a physical interface, a link of

6   the access facilities;

7   b)   associating at least one logical interface with

8   the physical interface;

9   c)   associating customer context information with the

10   logical interface;

11   d)   upon receiving data from a customer device, adding

12   the customer context information to generate modified

13   data;

14   e)   if the data received from the customer device is

15   an address advertisement, then forwarding the modified

16   data to an edge information update facility; and

17   f)   if a table update is received from the edge

18   information update facility, then updating a carrier

19   information table.

1   28.   The method of claim 27 wherein the carrier information
2   table associates carrier information with a layer 3
3   destination address and at least a part of customer context
4   information.

1   29.   The method of claim 27 wherein the modified data is
2   forwarded to the edge information update facility via a
3   network other than the transport network.

1   30.   The method of claim 27 wherein if the data received
2   from the customer device is an address advertisement, first
3   encapsulating the modified data in carrier information
4   before forwarding the modified data to an edge information
5   update facility.

1   31.   For use in a system including a transport network, the
2   transport network including at least two edge devices, each
3   of the at least two edge devices being accessible to
4   customer devices via access facilities and having logical
5   interfaces, each logical interface uniquely associated with
6   a customer device and having associated customer context
7   information, a machine readable medium having stored
8   thereon a customer context-based forwarding table, the
9   customer context-based forwarding table comprising a
10   plurality of entries, each of the entries including:
11   a)   carrier information; and
12   b)   at least a part of a layer 3 destination address
13   and at least a part of customer-based context
14   information.

1   32.   The machine readable medium of claim 31 wherein
2   devices of different customers can have the same layer 3

3　　address, such devices being uniquely addressable based on
4　　at least a part of their layer 3 address and at least a
5　　part of customer-based context information.

1　　33.　The machine readable medium of claim 31 wherein the at
2　　least a part of customer-based context information includes
3　　information for uniquely identifying a customer.

1　　34.　The machine readable medium of claim 33 wherein the
2　　information for uniquely identifying a customer is a
3　　VPN-OUI.

1　　35.　The machine readable medium of claim 33 wherein the at
2　　least a part of customer-based context information further
3　　includes information for uniquely identifying a host of a
4　　given customer.

1　　36.　The machine readable medium of claim 35 wherein the
2　　information for uniquely identifying a host of a given
3　　customer is a VPN-Index.

1　　37.　The machine readable medium of claim 31 further
2　　comprising:
3　　　　c)　a layer 3 address of an egress edge device.

1　　38.　For use in a system including a transport network, the
2　　transport network including at least two edge devices, each
3　　of the at least two edge devices being accessible to
4　　customer devices via access facilities and having logical
5　　interfaces, each logical interface uniquely associated with
6　　a customer device and having associated customer context
7　　information, in an edge information update facility, a

8   method for determining and signaling carrier information

9   updates, the method comprising:

10   a)   accepting an address advertisement, including

11   customer context information and encapsulated in

12   carrier information;

13   b)   removing the carrier information;

14   c)   if the address advertisement constitutes new and

15   changed information, updating edge information for the

16   transport network; and

17   d)   disseminating carrier information to each of the

18   at least two edge devices.

1   39. For use in an edge device of a transport network, an

2   aggregation unit for processing data, received from a first

3   customer device via access facilities, addressed to a

4   second customer device, the aggregation unit comprising:

5   a)   a physical interface for terminating a link of the

6   access facilities;

7   b)   at least one logical interface associated with the

8   physical interface;

9   c)   a storage device for storing customer context

10   information associated with the logical interface; and

11   d)   means for, upon receiving the data,

12   i)   removing at least a part of layer 2 address

13   information from the data to generate resulting

14   data, and

15   ii) adding the customer context information to

16   the resulting data to generate modified data.

1   40. For use in a system including

2   -   a transport network, and

3   -   an aggregation unit for processing data, received

4   from a first customer device via access facilities,

5   addressed to a second customer device, the aggregation

6   unit including (a) a physical interface for

7   terminating a link of the access facilities, (b) at

8   least one logical interface associated with the

9   physical interface, (c) a storage device for storing

10   customer context information associated with the

11   logical interface, (d) means for, upon receiving the

12   data, adding the customer context information to the

13   data to generate modified data, and (e) means for

14   aggregating the modified data at the logical interface

15   with other modified data at other logical interfaces,

16   for trunking on a shared network-facing,

17   communications link,

18 an access router, the access router comprising:

19   a)   a port for receiving the modified data from the

20   shared, network-facing, communications link; and

21   b)   means for encapsulating the modified data with

22   carrier information, used to forward the modified

23   data, across the transport network, to a second edge

24   device associated with the second customer device.

1   41.   The access router of claim 40 wherein the carrier

2   information includes an address of the second edge device.

1   42.   The access router of claim 40 wherein the data

2   includes a layer 3 destination address corresponding to a

3   layer 3 address of the second customer device, and

4   wherein the address of the second edge device is

5   derived from the layer 3 destination address included in

6   the data and at least a part of the customer context

7   information.

1   43.   For use in a system including a transport network, the

2   transport network including at least two edge devices, each

3   of the at least two edge devices being accessible to

4   customer devices via access facilities and having logical

5   interfaces, each logical interface uniquely associated with

6   a customer device and having associated customer context

7   information, in a route update facility, an edge

8   information update facility comprising:

9   a)   an input facility for accepting an address

10   advertisement, including customer context information

11   and encapsulated in carrier information;

12   b)   means for removing the carrier information;

13   c)   means, if the address advertisement constitutes

14   new and changed information, for updating edge

15   information for the transport network; and

16   d)   a signaling facility for disseminating carrier

17   information to each of the at least two edge devices.